Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

DMITRI IVANOVITSCH MENDELÉEFF (1834–1907)

Foreign Honorary Member in Class I, Section 3, 1889.

> "Strecker, De Chancourtois, and Newlands stood foremost in the way towards the discovery of the periodic law, and. . .they merely wanted the boldness to place the whole question at such a height that its reflection on the facts could be clearly seen."
>
> Mendeléeff's Faraday Lecture.

In such modest fashion this distinguished Foreign Honorary Member of the American Academy of Arts and Sciences characterized his greatest contribution to the sum of human knowledge.

Dmitri Ivanovitsch Mendeléeff, the youngest of fourteen children, was born to his parents, Ivan Pavlovitsch and Maria Dmitrievna, in Tobolsk, Siberia, on January 27th, (O. S.) 1834. His father, the Director of the College at Tobolsk, was a man of social preëminence and splendid education. It is his mother, however, who in greater measure excites our wonder and admiration. Under a regime which gave little opportunity for the higher education of women, she began to acquire the knowledge which she craved by repeating the lessons of her brother Vassili. "Books are the best friends of my life," she later assures us, "and it would be hard for me to exist only for the needs of the body, and to have no moments free for the heart, the mind, and the soul." Nor were her abilities limited to things intellectual, for when her husband lost his eyesight, and was compelled to resign, she administered with success and profit her brother's glass factory, and thus secured the means to bring up her numerous children.

Enrolled in the Gymnasium at Tobolsk at the early age of seven, Dmitri became deeply interested in science and mathematics. But he incurred the displeasure of his masters because of his distaste for languages, especially Latin — indeed he was always an inveterate foe of classicism in education. The closing years of his course brought with them his father's death, and the destruction of the glass factory by fire. In 1849, his mother wound up her affairs at Tobolsk, and brought her favorite son to Moscow. She intended to make him a student of medicine, but this career was closed to him when he collapsed at the sight of a corpse. In spite of failing strength and resources, she struggled on to St. Petersburg, where he was at last admitted to the Pedagogic Institute of the University and granted a scholarship. In the autumn of this year the mother died, with the injunction: — "Refrain from illusions, insist on work and not on words. Patiently search divine and scientific truth."

At the University, in spite of a dangerous weakness of the lungs, he "found himself" from the mental standpoint, and astonished all his instructors by his zeal and ability. His dissertation on isomorphism was ready in 1855, and the brilliancy of his final examination was recognized by the award of a gold medal. Although the condition of his health necessitated his immediate departure for the Crimea, he was soon able to go back to St. Petersburg. In 1859 he studied with Regnault in Paris, and later with Bunsen in Heidelberg. Upon his second return to St. Petersburg he attained the doctorate, and was soon made Professor in the Technological Institute. In 1866 he became Professor of General Chemistry in the University, a position which he held till 1890, when he resigned in consequence of friction with the authorities; in 1893 he was appointed Director of the Bureau of Weights and Measures, a position which he held until his death on January 20 (O. S.), 1907.

Mendeléeff was twice married, first in 1863, to a lady named Lestshoff, by whom he had a son Vladimir and a daughter Olga. Divorced from her, he married, in 1881, Anna Ivanovna Popova, an artist of ability, who bore him four other children, Lioubov, Ivan, and the twins Maria and Vassili.

His interests were by no means confined to pure science. The tremendous development of the petroleum industry in Russia is closely associated with the name of Mendeléeff, as is also the exploitation of some of her largest coal fields. He made an intimate study of the tariff question and urged reasonable protection for Russian industries, a policy which had far-reaching consequences. Agriculture, art, astronomy, education, and philosophy all received attention for him. In 1875 spiritualism gained many adherents in St. Petersburg, and Mendeléeff suggested a commission to investigate it by scientific methods. After a thorough study of famous mediums, this body, of which he was a member, concluded that all such phenomena resulted from unconscious movements or deliberate deception. His last work (1906) "Information about Russia," which ran through four editions in the six months following its initial publication, discussed his country from racial, religious, economic, industrial and educational standpoints.

Mendeléeff's travels were extensive. He had a first-hand acquaintance with the greater part of Russia; France and Germany he visited during his student years; in 1889 he delivered the Faraday Lecture in London, and again in 1891 he visited France and England to investigate the manufacture of smokeless powder. In 1893 he came to America, and attended the World's Fair in Chicago, which he did not fail to describe in an article published after his return.

Mendeléeff was a typical Russian; tall in figure, broad shouldered, with a head of unusual size, crowned with a remarkable abundance of hair. His full beard was blond; and his blue eyes deep set and piercing. His voice was deep, his gait rapid, and he was given to nervous and rapid movements of the hands. Restless, imperious, and brusque at times, nicknamed "the lion in his den," he was still affable, democratic, and deeply beloved by students and common people alike. He was a lifelong adherent of the Orthodox Church, and a ready friend to the discouraged and downtrodden. Such was the personality of one of Russia's greatest sons.

Mendeléeff's works, published between 1854 and 1907, include two hundred and sixty-six titles, according to Walden's compilation. They give evidence of the wide scope of his interests and activities, as already mentioned above. Among the purely scientific subjects which claimed his most careful attention were: — the densities of liquids, the relation between the volume of liquids and temperature, the formation of compounds between solvent and solute, and the compressibility of gases under reduced pressures. Of lasting influence upon instruction in the science is his masterly "Principles of Chemistry," which appeared in eight Russian and three English editions. Its most striking feature is found in the voluminous notes, appended to the text proper. These notes enlarge upon debatable subjects and theoretical questions, portraying Mendeléeff's personal opinions and habits of thought. In the Preface he remarks: —

"Knowing how contented, free, and joyful is life in the realms of science, one fervently wishes that many would enter their portals. On this account many pages of this treatise are unwittingly stamped with the earnest desire that the habits of chemical contemplation which I have endeavored to instil into the minds of my readers will incite them to the further study of science. Science will then flourish in them and by them, on a fuller acquaintance not only with the little that is enclosed within the narrow limits of my work, but with the further learning which they must imbibe in order to make themselves masters of our science and partakers in its further advancement."

His name will always be most closely associated with the announcement of the Periodic Law. In March, 1869, before the Russian Chemical Society, he set forth his conclusions as follows: —

"1. The elements, if arranged according to their atomic weights, exhibit an evident *periodicity* of properties.

"2. Elements which are similar as regards their chemical properties have atomic weights which are either of nearly the same value (e. g., platinum, iridium, osmium) or which increase regularly (e. g., potassium, rubidium, caesium).

"3. The arrangement of the elements, or of groups of elements in the order of their atomic weights corresponds to their so-called *valencies* as well as, to some extent, to their distinctive chemical properties — as is apparent among other series in that of lithium, beryllium, boron, carbon, nitrogen, oxygen and fluorine.

"4. The elements which are the most widely diffused have *small* atomic weights.

"5. The *magnitude* of the atomic weight determines the character of the element just as the magnitude of the molecule determines the character of a compound body.

"6. We must expect the discovery of many yet *unknown* elements, for example, elements analogous to aluminium and silicon, whose atomic weight would be between 65 and 75.

"7. The atomic weight of an element may sometimes be amended by a knowledge of those of the contiguous elements. Thus, the atomic weight of tellurium must lie between 123 and 126, and cannot be 128.

"8. Certain characteristic properties of the elements can be foretold from their atomic weights."

In his Faraday Lecture, June 4th, 1889, he describes, in dramatic fashion, the verification of his predictions:—

"Before the promulgation of this law the chemical elements were mere fragmentary, incidental facts in Nature; there was no special reason to expect the discovery of new elements, and the new ones which were discovered from time to time appeared to be possessed of quite novel properties. The law of periodicity first enabled us to perceive undiscovered elements at a distance which formerly was inaccessible to chemical vision; and long ere they were discovered new elements appeared before our eyes possessed of a number of well-defined properties. We now know three cases of elements whose existence and properties were foreseen by the instrumentality of the periodic law. I need but mention the brilliant discovery of *gallium,* which proved to correspond to eka-aluminium of the periodic law, by

Lecoq de Boisbaudran; of *scandium*, corresponding to eka-boron, by Nilson; and of *germanium*, which proved to correspond in all respects to eka-silicon, by Winkler. When, in 1871, I described to the Russian Chemical Society the properties, clearly defined by the periodic law, which such elements ought to possess, I never hoped that I should live to mention their discovery to the Chemical Society of Great Britain as a confirmation of the exactitude and the generality of the periodic law. Now, that I have had the happiness of doing so, I unhesitatingly say that although greatly enlarging our vision, even now the periodic law needs further improvements in order that it may become a trustworthy instrument in further discoveries."

Since this time two hitherto unsuspected groups of elements have been discovered and proved capable of inclusion within the Periodic System: — the inert gases, affording a natural transition between the halogens and the alkali metals; and the radio-active elements, which for the most part long defied classification, but which now, thanks to Fajans and Soddy, constitute a further proof of the universality of the law. His attempt to introduce into the system the hypothetical element coronium with an atomic weight of 0.4, and the "ether" of the physicist with the atomic weight of 0.000000000053 have scarcely found acceptance, especially since Moseley's calculation of atomic numbers has indicated that hydrogen has the smallest atomic weight of any element.

Two of his fundamental ideas in connection with the Periodic System remain open to question: First, his repugnance to the doctrine of the unity of matter; second, his contention that the elements, if arranged periodically, must follow inexorably in the order of the atomic weights. He lived to see many atomic weights revised so as to conform to this principle, and died with the conviction that tellurium, for instance, must have a lower atomic weight than iodine. The discovery of isotopy makes this outcome still a possibility.

Mendeléeff, given up by the doctors to die at an early age, lived in activity and usefulness to the age of seventy-three. The summer before his death, weakened by influenza, he began to put his affairs in order, but he retained his vigor of mind and his interest in current events up to the last. The Orthodox Church, the Czar, and the educational institutions of St. Petersburg rendered his memory extraordinary honors as he was borne out to be laid beside his mother and his favorite son. Count Witte well characterized his services when he said: — "In him Russia lost her pride, the great scholar and the upright patriot; industry lost its best adviser; the government a notable helper, and we, his acquaintances and admirers, a loyal friend and the best of men."

Acknowledgement is made of the use of P. Walden's biography, *Ber. d. deutsch. chem. Ges.*, *41*, 4719 (1908) and of W. A. Tilden's Memorial Lecture, *Jour. Chem. Soc.*, *95*^{2}, 2077 (1909). These papers contained material otherwise inaccessible.

George Shannon Forbes.

SIR JOHN MURRAY (1841–1914)

Foreign Honorary Member in Class II, Section 1, 1900.

Sir John Murray, the son of Scotch settlers in Canada, was born at Coburg, Ontario, on March 3d, 1841. There he passed the first seventeen years of his life. In the primitive conditions of a new community the natural robustness of his nature found a free development in congenial soil.

In 1858 he came to Edinburgh where he prepared for its University at the Stirling High School. His career at the University appears to have been stamped by some of the qualities that distinguished him in after life. Impatient of dogmatic authority, he was somewhat scornful of inherited tradition, and treated his prescribed studies with a cheerful sans gêne. For even in those days he desired to find out things for himself, and delve for knowledge independently. The capacity of clear and original thought, with a genius of disentangling the heart of a subject from its enveloping details, was as characteristic of the youth as of the man. From the small circle of scientific men who then made Edinburgh famous, he gathered, during his student days, what was most worth having, and went his way. That one of the facets of his personality drew him into a friendship with Louis Stevenson, offers a suggestive glimpse into a by-way of his character.

After continuing his scientific training for a period of several years at Bridge of Allen; he undertook a hazardous voyage to Spitzburgen, in a Peterhead whaler in 1868, to study the Arctic Sea. This was the initial exploit that marked him as a pioneer in Oceanography. With the history of the development of this science his